NG911 ROADMAP

Pathways toward nationwide interconnection of 911 services

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Executive Summary

Envisioning a Nationwide Next Generation 911 (NG911) System of Systems

The *NG911 Roadmap* (Roadmap) is a collaborative effort between the National 911 Program and 911 stakeholders from both public and private sectors. It focuses on what needs to be done at the national level—by any and all members of the 911 community—to achieve a nationwide NG911 system of systems. This concept entails the existence of NG911 capabilities at the jurisdictional level across the U.S. and interconnectivity among those systems nationwide. *Why?* The foundational benefit of nationwide interconnectivity is the ability to respond to 911 requests faster, with greater accuracy, greater resilience, and with a more consistent level of quality. First responders, emergency management, and other public safety entities would be able to provide optimal service not only to their own communities, but also to neighboring communities in need of additional resources or assistance. Furthermore, interconnectivity and interoperability among 911 systems poises us—as a nation—to obtain better awareness of community needs, identify 911 trends, and evaluate how effectively U.S. residents and visitors are served.

NG911 Capabilities at the Jurisdictional Level—An Essential Ingredient

Progress is being made toward NG911, but, there are "road blocks" ahead. Since 2012, the National 911 Program[1] and the National Association of State 911 Administrators (NASNA) have reported annually on progress made by U.S. states, commonwealths, and territories toward achieving NG911 capabilities (for the purpose of this report, the term, "state" will be used when referencing any such entity). As evidenced in the November 2017 report, *2017 National 911 Progress Report*[2], forward momentum toward NG911 services has continued since the year 2012; however, data voluntarily shared by states[3] (reflecting 2015

[1]The National 911 Program, created by Congress in 2004 as the 911 Implementation and Coordination Office, is housed within the U.S. Department of Transportation National Highway Traffic Safety Administration. It is a joint program with the U.S. Department of Commerce National Telecommunication and Information Administration. https://www.911.gov.

[2]*2017 National 911 Progress Report* findings are based on data collected during the calendar year 2017 which reflects data produced in 2016.

[3] State data is collected and maintained via the National 911 Program's *National 911 Profile Database*.

and 2016 activity) appear to show that progress may have plateaued in certain areas. For example, findings show that in 2015, 20 of 45 reporting states indicated they have adopted statewide NG911 plans—this is the same number of states that reported having plans by the end of 2016[4]. The Federal Communications Commission (FCC) also reports annually on aspects of NG911 developments. In its *Ninth Annual Report to Congress on State Collection and Distribution of 911 and Enhanced 911 Fees and Charges*, the FCC found that in calendar year 2016, 39 of 46 reporting states "engaged in NG911 programs" and 13 states deployed statewide Emergency Services Internet-protocol Networks (ESInets)[5] which are a core component of NG911 functionality. When considering these numbers, it is important to note that data provided in these reports do not necessarily present a qualifiable picture. It is difficult to holistically assess the level of success to which NG911 system components have actually been implemented post-installation. Therefore, the level of progress toward *operational* NG911 capabilities is unclear and difficult to measure.

Meanwhile, the speed at which technology advances remains stunningly rapid, and the resultant effects on the public's mobility and access to new communication devices and applications continue to challenge 911 services. As the 911 community strives to enhance its reach, operations, and efficiency, barriers can be encountered at nearly every junction—crossroads and barriers that either influence or are influenced by various policy, governance, funding, technical, and operational factors. Such challenges impede the rate by which jurisdictions are able to achieve NG911, thus hindering their ability to consistently provide and continuously improve 911 services to their immediate populations. Jurisdictional systems are also rendered highly vulnerable to situations that can potentially disrupt service delivery entirely. Without homogeneous NG911 capabilities at the jurisdictional level, broader progress toward achieving seamless interoperability and the vision of national interconnectivity is hindered, resulting in a national inability to efficiently address emergency service needs that span boundaries.

Identifying What Should be Done at the National Level

This Roadmap focuses on what can be done *at the national level* to help jurisdictions advance and become poised to contribute to the culmination of a nationwide NG911 system of systems. It is important to understand that as it relates to this document, the term "national" is used specifically to indicate that of which is of nationwide importance, relevance, or impact.

[4] National 911 Program, *2017 National 911 Progress Report*: 59-60.
[5] Federal Communications Commission *Ninth Annual Report to Congress on State Collection and Distribution of 911 and Enhanced 911 Fees and Charges*: 3.

Stating that the Roadmap discusses national-level solutions that may be developed and implemented to facilitate nationwide interconnectivity means just that—such solutions and strategies can be addressed by any stakeholder entity or group of entities regardless of public or private sector status or organizational purpose. In other words, use of the term "national" is not intended to convey that creating and implementing solutions, strategies, or a nationwide system of systems should or will be an initiative of the Federal Government. While the Federal Government may play a supportive role in some areas, the Roadmap is intended to materialize through efforts undertaken by the spectrum of stakeholders that comprise the 911 community.

Specifically, the Roadmap identifies potential tasks in support of the following goals:

1. ***Business/Governance Goal:*** Identify strategies and resources to address policy, regulatory, governance, and funding issues or obstacles faced by jurisdictions both independently (along their transition to NG911 capabilities) and collectively as they relate to achieving nationwide interconnectivity.
2. ***Technology (Tech) Goal:*** Stimulate adoption and enable implementation of NG911 technology by promulgating NG911 open standards and establishing means by which emerging technologies can be validated for compliance and security.
3. ***Data Goal:*** Support the enhancement of 911 services by establishing technical and operational data solutions that support cross-jurisdictional and national-level situational awareness, interoperability, information sharing, and predictive data analysis.
4. ***Operations (Ops) Goal:*** Distinguish, enhance, and promote operating procedures, performance evaluation, and professional development strategies that support complete and streamlined implementation of NG911 capabilities.
5. ***Cross-cutting Goal:*** Facilitate education and knowledge transfer on an ongoing basis.

The "Call to Action"

The Roadmap is relevant to everyone. Any entity or individual who influences, contributes to, or benefits from 911 services has a potential role in bringing the Roadmap to life. While the National 911 Program intends to be the "keeper of the list" and monitor progress in completing the tasks included in this document, responsibilities for specific tasks were not assigned. It is assumed that individuals, agencies, organizations, and the 911 community at large will address, inform, or champion specific issues once they are identified and publicized. Simply put—the "call to action" is to *take action in a manner that aligns best with your expertise, interests, and priorities.*

Contributors

The National 911 Program would like to thank the following individuals who, on behalf of their organizations, worked tirelessly to develop this document.

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Without the generous contribution of their experience and expertise, the completion of this document would not have been possible.

The National 911 Program will maintain and update the Roadmap as the community makes headway. Please contact the program at NHTSA.National911@dot.gov if you have any questions, updates, or information on progress made in any of the goal areas described.

About the Roadmap

The Purpose of the Roadmap

This Roadmap focuses on what needs to be done at the national level—by any and all members of the 911 community (including the public)—to achieve a nationwide NG911 system of systems. The Roadmap does not include specific solutions to the issues it discusses—there are many entities that have produced formative work on how to address relevant issues on a granular level. Instead, the Roadmap focuses on how to best leverage all of the hard work that has already been accomplished, identify any gap areas that need attention, and provide context as to why certain initiatives and tasks are worth exploring. Any entity or individual who influences, contributes to, or benefits from 911 services is encouraged to step forward and contribute to the implementation of any task within the Roadmap—it is the 911 community that has the collective knowledge, experience, and reach necessary for advancing the evolution of NG911.

How the Roadmap is Organized

The Roadmap begins by introducing the definition of NG911, then relates NG911 capabilities to how they would conceptually look at both jurisdictional and national levels. From there, it dives into each of the five goal areas: 1) Business/Governance, 2) Technology, 3) Data, 4) Operations, and 5) a Cross-cutting Goal that involves ongoing education and knowledge transfer. Within each, specific issue areas of national focus are described and followed by one or more potential tasks for exploring next steps toward achieving a nationwide, interconnected NG911 system of systems. Some activities will require further research and are not intended to hone in on exactly what is needed in order to "turn the corner." Others involve developing best practices and guidance so that jurisdictions can avoid inconsistency and having to "reinvent the wheel." Additionally, the Roadmap includes the cross-goal task of identifying the best way to harness and leverage research, tools, standards, best practices, requirements, and other resources that have been developed throughout the 911 community over the years. To help you determine a path toward contributing to any activity, recent and current efforts of note are included. A general snapshot of goal elements is provided in Figure 1 on the next page.

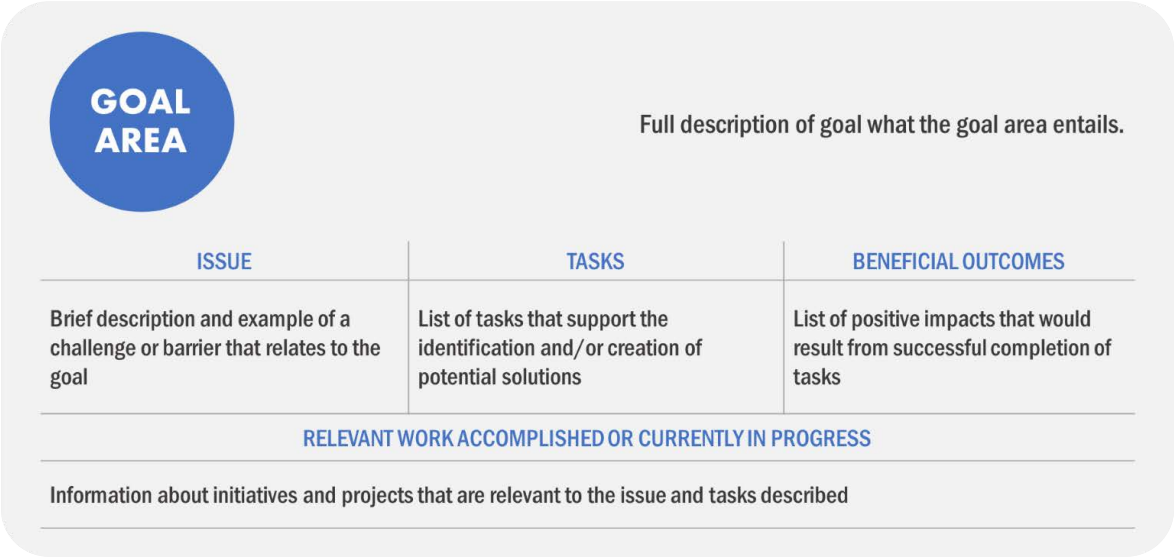


Figure 1: Snapshot of How Goal Areas are Organized

A Note on Terminology

In some cases, to keep things simple, generic terms have been used to identify entities, circumstances, or activities that are quite complex once dissected. Key instances for which this approach was taken pertain to the following terms:

- *State*. As mentioned earlier in the Executive Summary, the Roadmap applies the term, "state," to include U.S. states, commonwealths, territories, and tribal communities.
- *National*. As also mentioned earlier in the Executive Summary, the Roadmap applies the term, "national," to describe activities, systems, or resources that are important, relevant, impactful, or applicable to the Nation as a whole. The term, as used, is not intended to refer to national/federal government.
- *Jurisdiction*. The Roadmap applies the term, "jurisdiction," generically to include localities, regions, towns, rural communities, and states.
- *Call*. While the ability to process 911 requests that are initiated via multiple modes of communication lies at the essence of NG911 capabilities, the Roadmap applies the term, "call," generically to include any mode of contact. This use of the term aligns with the definition that appears in National Emergency Number Association's (NENA) *Master Glossary of 9-1-1 Terminology*.[6]

[6] "Call: A generic term used to include any type of Request for Emergency Assistance (RFEA); and is not limited to voice. This may include a session established by signaling with two way real-time media and involves a human making a request for help. We sometimes use 'voice call', 'video call', or 'text call' when specific media is of primary importance. The term 'non-human-initiated call' refers to a one-time notification or series of data exchanges established by signaling with at most one way media, and typically does not involve a human at the 'calling' end. The term 'call' can also be used to refer to either a 'Voice Call', Video Call', 'Text Call' or 'Data-only call,' since they are handled the same way through most of NG9-1-1."

Working toward a National-scale NG911 System of Systems

What We Mean by NG911

"NG911 services" means a secure, Internet Protocol (IP)-based, open standards system comprised of hardware, software, data, and operational policies and procedures that:

- Provides standardized interfaces from emergency call and message services to support emergency communications;
- Processes all types of emergency call, including voice, text, data, and multimedia information;
- Acquires and integrates additional emergency call data useful to call routing and handling;
- Delivers the emergency calls, messages, and data to the appropriate PSAP [public safety answering point] and other appropriate emergency entities based on the location of the caller;
- Supports data, video, and other communications needs for coordinated incident response and management; and
- Interoperates with services and networks used by first responders [and other 911 systems] to facilitate emergency response."[7]

In addition to the technical factors described above, NG911 also encompasses the many governance and operational aspects that enable the described functions to perform successfully. These elements are described in the FCC Task Force on Optimal PSAP Architecture's (TFOPA) *Adopted Final Report*, released on January 29, 2016.[8]

[7] The NG911 definition was mutually agreed upon by the National 911 Program, NENA, NASNA, and iCERT on January 12, 2018.
[8] https://www.fcc.gov/document/fcc-releases-tfopa-final-report

NG911 at the Jurisdictional Level

As shown below in Figure 2, the end-state of NG911 capabilities at the jurisdictional level entail both technical and operational aspects of implementing and operating NG911 core services. These core services facilitate interaction with originating service providers (OSPs), PSAP systems and operations, radio networks, extended emergency services, and geographical information systems (GIS).

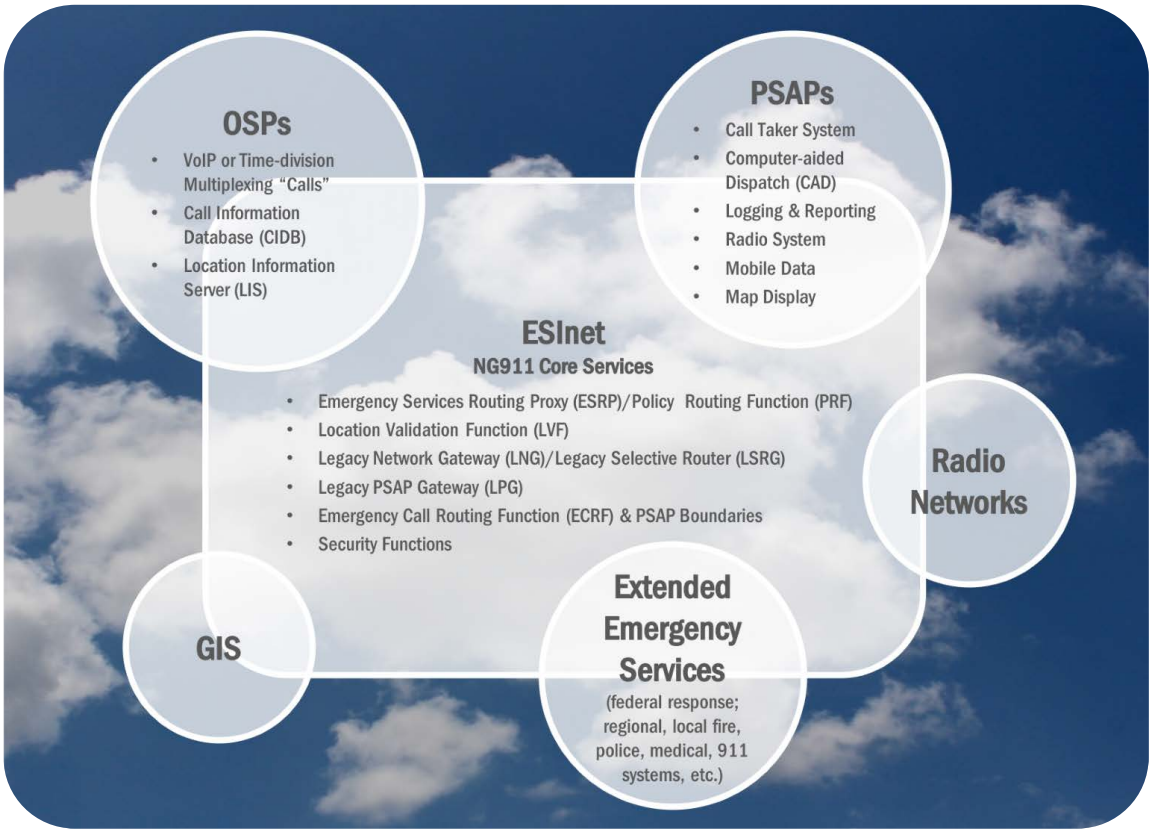


Figure 2: High-level Abstract View of a Jurisdictional NG911 Environment

NG911 at the National Level

Looking at the future state of NG911 at the national level entails moving from *approximately 6,000 independent operations to a system of approximately 6,000 interconnected operations*. In the most simplified view, one could consider an NG911 system of systems as depicted in Figure 3 on the next page. However, it is the 911 community that will decide how this environment is manifested, and this broad concept will be incrementally defined and sculpted jurisdiction by jurisdiction.

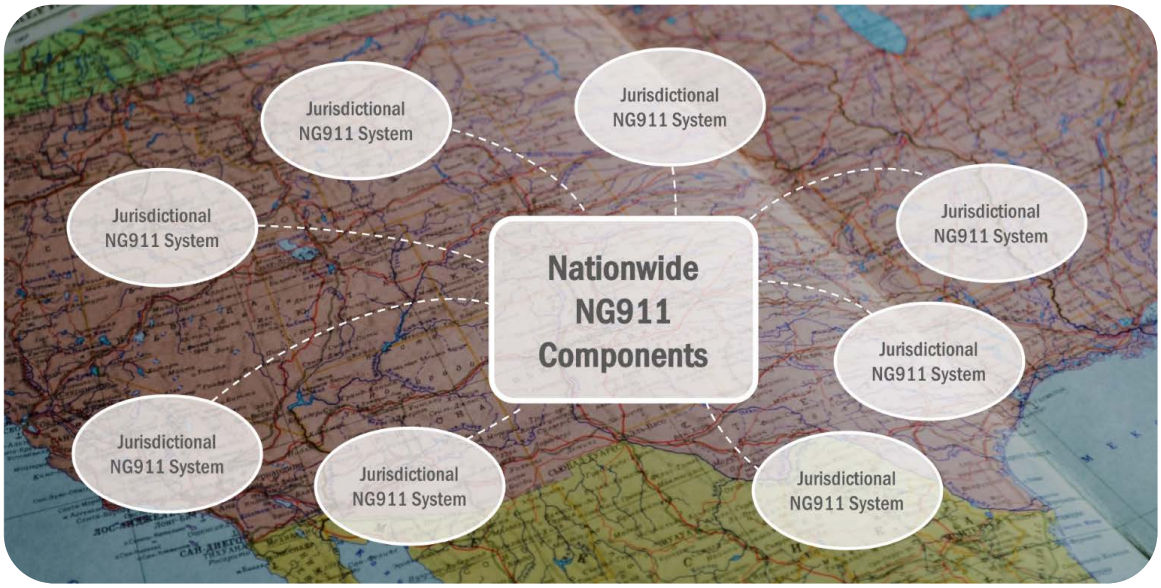


*Figure 3: Abstract View of a Potential NG911 System of Systems that Connect with a National Capability via Technical Linkages **and** Operational Policies and Procedures*

Why Nationwide Interconnectivity?

The foundational benefit of nationwide interconnectivity is the ability to respond to requests faster, with greater accuracy, greater resilience, and with a more consistent level of quality. For example, first responders often cross boundaries to either serve their own communities or help neighboring jurisdictions. Trying to operate with different systems and/or with incompatible or inconsistent policies, procedures, and standards presents challenges that may hinder optimal service to the public. Without interoperability, jurisdictions are without the means to truly communicate effectively, know the communities that surround them, identify 911 trends, or evaluate their performance.

To help ponder the benefits of nationwide NG911 interconnectivity, we can look through the lens of "real life" scenarios. Imagine that you are talking to your grandmother who lives across the country. Suddenly, she becomes fearful she is having a heart attack, so you call 911 but get your local PSAP. With NG911 in place nationwide, the PSAP would be able to transfer their 911 call from your location—an improvement from how such a situation would be handled in today's siloed environment. Another example benefit of nationwide interconnectivity pertains to a common issue in today's environment—outdated addresses registered to Voice over Internet-protocol (VoIP) phones. (Imagine how often this is the case for military personnel who are required to continuously relocate!) Enhanced location services made possible by NG911 functionality addresses this issue and enables 911 services to respond to where you are physically without losing time due to routing that is based on where you are on paper.

In addition to the benefits for the individual U.S. resident or visitor, a nationwide NG911 system of systems also poses national-scale value. The ability to comprehensively collect, view, and analyze 911 data at the national level supports mitigation efforts in a variety of ways. With such capabilities, we will be able to keep track of the needs and behaviors of our society as a whole, make evidence-based decisions about how to address pervasive challenges, identify evolving needs, and better prepare our resources to help meet them.

Value Propositions for Every Stakeholder

The value of nationwide interconnection of 911 networks and systems is multi-faceted and unique to each stakeholder group that contributes to, operates within, and benefits from effective 911 services. Table 1 on the next page identifies a few distinct areas of value for 911 service providers, public safety professionals, organizations that provide support for populations in crisis, private industry, and the public.

	INCLUDES, BUT IS NOT LIMITED TO...	VALUE PROPOSITIONS
	• PSAP managers and telecommunicators • 911 administrators • 911 legislators • Governmental offices and national organizations that provide services in support of 911, e.g., Information Technology (IT), GIS, standards development organizations	• More efficient handling of 911 requests at every phase of a call's entire lifecycle. • Heightened (and more purposeful) access to richer, accurate data, enabling more effective response and more purposeful decisionmaking at the policy level. • Access to richer data and information on requestor location and level of need at all times and from any PSAP. • Continuity of operations and avoidance of any lapse in service availability due to disruptions experienced by a given PSAP. • Opportunities for increased standardization of 911 operations and establishment of baseline skillsets for 911 professionals across the country.
	Agencies and professional organizations that represent: • Emergency medical services • Fire services • Law enforcement • Emergency management • Search and rescue • Poison control	• Heightened awareness of a caller's needs, location, and conditions. • Ability to accurately transfer information to the most appropriate responders who can provide the most expedient services. • Ability to arrive at the right scene faster. • Ability to more rapidly procure augmentative support from other public safety services within or outside of jurisdictional boundaries. • Access to richer, more comprehensive data that enables the ability to establish and meet purposeful performance metrics, justify funding requests, and heighten efforts to keep responders safe and healthy.
	Centers/hotlines providing specialized response and support services, such as: • Suicide prevention • Abuse and crisis intervention • Missing persons intervention	• Easier, more expeditious access to 911 systems, enabling rapid response to specialized needs. • Ability to send richer, more contextual data to 911 systems.
	• Telecommunications carriers • Network service providers • Computer-aided dispatch vendors • Customer premises equipment (CPE) vendors • Telematics providers	• Mechanisms by which to certify services and technology as compliant with NG911 open standards. • Parity in regard to legal liability protection. • Reduction in interconnection points. • Heightened ability to route 911 calls to the most appropriate PSAP.
	All U.S. residents and visitors; includes specialized support for groups with specific needs, such as: • Users of mobile health devices • Persons with disabilities • Limited English Proficient persons	• Faster connection to telecommunicators (thus emergency services that can respond in the most immediate manner). • Ability to use existing technology. • Able to provide better data and information (e.g., multimedia). • In some cases, negation of need to physically initiate the emergency call.

Table 1: Value of a Nationwide NG911 System of Systems

Where We are Now…and Where We are Headed

Today, we operate in a siloed environment.
Coordinating across jurisdictions is a challenge. There are approximately 6,000 PSAPs in operation, each with varying governance structures and operational environments.

We do not know how ready we are for NG911.
Assessing levels of NG911 functionality is a challenge. PSAPs that are operating through an ESInet or that have installed and tested other NG911 parts, functions, or components may or may not be using functions to their full potential.

Not every jurisdiction has an NG911 champion or planner.
Getting buy-in at local, regional, state, tribal, and federal levels is crucial for moving forward. Without a jurisdictional champion, motivating transition is a steep uphill climb.

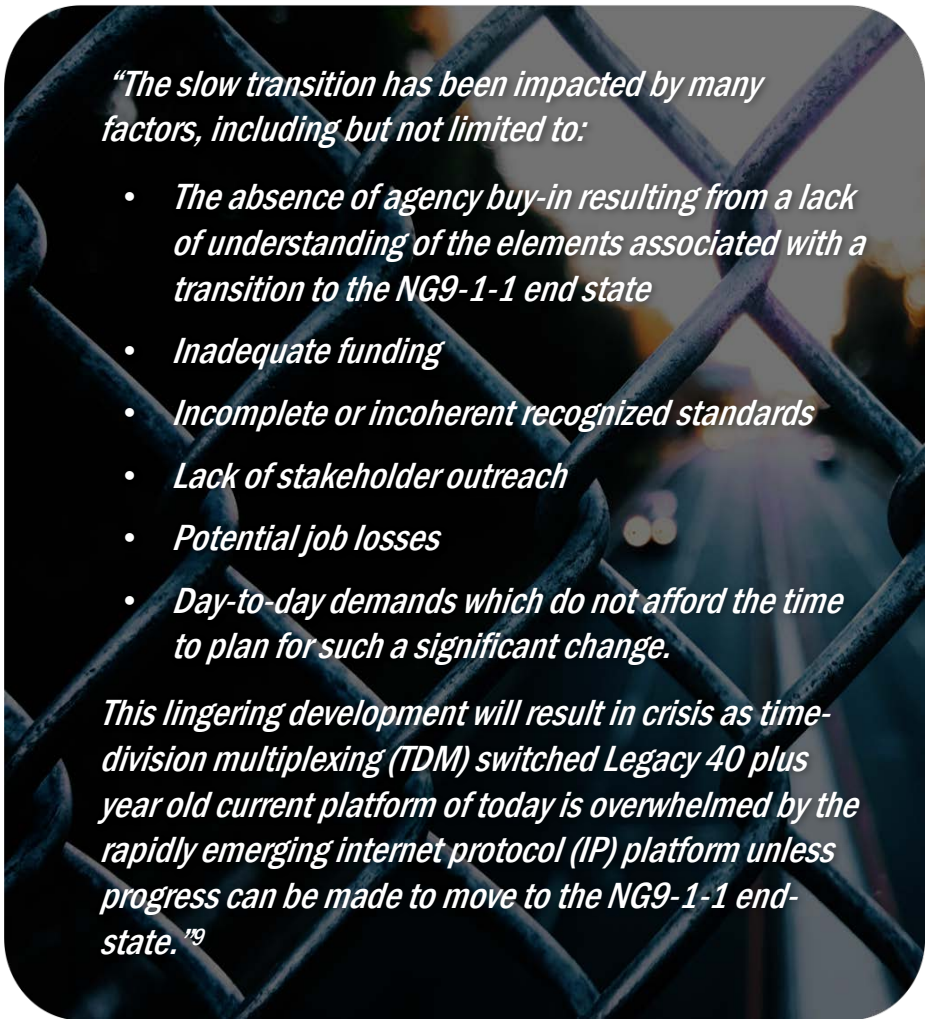
We will all be on the same page!
All jurisdictions will be "bought in" and will have access to the tools needed to garner support and commit time and resources to moving forward.

We will know more so we can do more!
With all jurisdictions on board, we can truly assess our current technical and operational capabilities and connect the dots between gap areas and end-state capabilities.

No more silos!
Ultimately, as jurisdictions reach full NG911 functionality and national-level NG911 components are in place, 911 systems will be interconnected, interoperable, and able to provide optimal services to anyone at any location.

Key Challenges Faced by the 911 Community

As indicated in the December 2016 TFOPA Working Group 2 report titled, *Phase II Supplemental Report: NG9-1-1 Readiness Scorecard*, among the barriers that impede nationwide progress toward NG911 capabilities include lack of understanding, funding, standards, outreach, and bandwidth for planning.



In addition to the challenges identified, the lack of jurisdictional champions to help address these issues magnifies the barriers. And, these challenges are complex and nuanced by various distinct characteristics of each jurisdiction (e.g., regulatory conditions, governmental structure, state-strong versus local-strong environment).

[9] FCC TFOPA, *Working Group 2 Phase II Supplemental Report: NG9-1-1 Readiness Scorecard:* 6.

A Path Forward

The majority of tasks identified in this Roadmap are categorized by four interdependent topic-specific goals. Within and across each goal area are cross-cutting tactics that are interrelated and interdependent, each serving as a building block to the broader vision. For example, funding and operational support, and standards and requirements development are ubiquitous enablers of success. Furthermore, outcomes produced as a result of addressing Roadmap tasks will need to be socialized and disseminated to ensure synchronization across efforts. Therefore, a cross-cutting fifth goal addresses the need for ongoing education and knowledge transfer.

Identify strategies and resources to address policy, regulatory, governance, and funding issues or obstacles faced by jurisdictions both independently (along their transition to NG911 capabilities) and collectively as they relate to achieving nationwide interconnectivity.

Stimulate adoption and enable implementation of NG911 technology by promulgating NG911 open standards and establishing means by which emerging technologies can be validated for compliance and security.

Support the enhancement of 911 services by establishing technical and operational data solutions that support cross-jurisdictional and national-level situational awareness, interoperability, information sharing, and predictive data analysis.

Distinguish, enhance, and promote operating procedures, performance evaluation, and professional development strategies that support complete and streamlined implementation of NG911 capabilities.

Facilitate education and knowledge transfer on an ongoing basis.

Identify strategies and resources to address policy, regulatory, governance, and funding issues or obstacles faced by jurisdictions both independently (along their transition to NG911 capabilities) and collectively as they relate to achieving nationwide interconnectivity.

ISSUE	TASK(S)	BENEFICIAL OUTCOMES
INTEGRITY OF 911 FUNDS Across the U.S., 911 funds are used for a variety of expenditures and sometimes are used for non-911 related interests. For example, how "fee diversion" is defined across jurisdictions is inconsistent, thus jeopardizing the integrity with which 911 funds are used and whether they are applied to NG911 maturation.	**Business 1. Concretely define what constitutes eligible spending of 911 funds.** **Business 2. Identify key hemorrhage points in current spending approaches.** **Business 3. Develop a nationally-accepted definition of the term, "fee diversion."** **Business 4. Develop a sustainable model for ensuring appropriate spending practices.**	• Visibility funding hemorrhage points n mitigation approaches that have or have not worked for jurisdictions in this area. • Data that may inform potential opportunities for establishing a national-level mechanism for mitigating diversion. • Information that informs the development of a nationally-adopted baseline taxonomy by which jurisdictions can develop effective legislative language that prevents state-level raiding of 911 fees and provides authority to audit providers to ensure accuracy of fees collected. • Increased motivation for jurisdictions to accurately report spending activities on a routine basis.

RELEVANT WORK ACCOMPLISHED OR CURRENTLY IN PROGRESS

- The FCC surveys states annually on their business models use of 911 funds.
- In 2013, the U.S. Government Accountability Office (GAO) released the report titled, *Most States Used 911 Funds for Intended Purposes, but FCC Could Improve Its Reporting on States' Use of Funds*
- On December 29, 2017, the FCC published its ninth annual report to Congress, *On State Collection and Distribution of 911 and Enhanced 911 Fees and Charges*.

Identify strategies and resources to address policy, regulatory, governance, and funding issues or obstacles faced by jurisdictions both independently (along their transition to NG911 capabilities) and collectively as they relate to achieving nationwide interconnectivity.

ISSUE	TASK(S)	BENEFICIAL OUTCOMES
FUNDING OF NATIONAL-SCALE RESOURCES Funding mechanisms for national-level products is needed in key areas. The lack thereof stagnates development and implementation of adopted concepts for solutions that enable nationwide capabilities. For example, capabilities and tools will need to be designed, implemented, and operated to support nationwide interconnectivity and safety of an NG911 system of systems. These include a nationwide ESInet to serve as a hub for jurisdictional ESInets, a nationwide Forest Guide, a nationwide PSAP Registry, a nationwide GIS data store, a nationwide Identity, Credential, and Access Management (ICAM) capability, and nationwide EC3 capabilities for cybersecurity.	**Business 5. Develop a comprehensive cost analysis for national-level products in need of development, testing, implementation, adoption, operations, and maintenance.** **Business 6. Develop a strategy for public policy supporting implementation and proper use of national-level products.** **Business 7. Develop an outreach and stakeholder engagement plan to explore feasible ownership and sustainable funding models.**	• Visibility on national-level products and solutions that are in need of champions/owners. • Clarity on the qualifications, capabilities, partnerships, and other resources that product champions/owners. would need to possess to effectively develop, implement, and/or maintain solutions. • Visibility on the willingness of qualified champions (and partners) to undertake responsibility.

RELEVANT WORK ACCOMPLISHED OR CURRENTLY IN PROGRESS

- NENA has published the guidance titled, *NENA Requirements for a National Forest Guide*. The guide contains an analysis of cost factors and cost recovery considerations that are helpful to identifying the next level of information needed to recruit and formalize a development and implementation champion.
- The FCC TFOPA describes the EC3 capability and related requirements in its report, *Optimal Cybersecurity Approach for PSAPs*.

Identify strategies and resources to address policy, regulatory, governance, and funding issues or obstacles faced by jurisdictions both independently (along their transition to NG911 capabilities) and collectively as they relate to achieving nationwide interconnectivity.

ISSUE	TASK(S)	BENEFICIAL OUTCOMES
NATIONAL FUNDING FOR JURISDICTIONAL NG911 PLANNING & IMPLEMENTATION Jurisdictions face funding issues that hinder their ability to implement or maintain steps toward NG911 maturation.	**Business 8. Maintain a funding stream for the NG911 grant program.** **Business 9. Identify long-term funding streams.**	Funding available to jurisdictions to develop and implement NG911 plans.

RELEVANT WORK ACCOMPLISHED OR CURRENTLY IN PROGRESS

- The National 911 Program is in the process of reenacting rules based on a new funding source. https://www.911.gov/project_911grantprogram.html
- The FCC TFOPA discusses the tenets of sustainable funding in its report, *Funding Sustainment Model*.
- The U.S. Department of Agriculture oversees *Rural Utilities Grants* that relate to 911 concerns via increasing access to broadband and 21st century telecommunications services.
- The U.S. Department of Homeland Security (DHS) supports 911 capacity building under its *Long-Range Broad Agency Announcement* program.
- The NG911 NOW Coalition (formed by NASNA, NENA, the Industry Council for Emergency Response Technologies [iCERT]) published its June 13, 2016 report titled, *NG9-1-1 Gap Analyses and Next Steps*, which discusses jurisdictional funding issues in more detail as they relate to state policy and funding mechanisms.

Identify strategies and resources to address policy, regulatory, governance, and funding issues or obstacles faced by jurisdictions both independently (along their transition to NG911 capabilities) and collectively as they relate to achieving nationwide interconnectivity.

ISSUE	TASK(S)	BENEFICIAL OUTCOMES
NG911 EDUCATION & PLANNING GUIDANCE Jurisdictional NG911 planning and implementation is inconsistent, thus stagnating the establishment of a nationwide environment that accommodates cross-jurisdictional interconnectivity.	**Business 10. Develop an inventory of jurisdictional NG911 roadmaps/plans.** **Business 11. Develop an analysis report on jurisdictional accomplishments with cross-boundary interconnectivity and identify how approaches can be scaled to the national level.**	• Visibility on how jurisdictions have approached NG911 strategies and handled policy, technical, governance, funding, and operational aspects of transition. • Identification of effective approaches (and relevant standards and requirements) toward interconnectivity that can be scaled and applied to the establishment of an NG911 system of systems. • Data that informs efforts toward establishing materials that heighten understanding (among all 911 stakeholders and the public safety community) about what the NG911 end-state entails.

RELEVANT WORK ACCOMPLISHED OR CURRENTLY IN PROGRESS

- The National 911 Program highlights jurisdictional accomplishments through its webinar series, *State of 911* and is in the process of working with NASNA to update the guidance titled, *Guidelines for Developing a State NG911 Plan* (to be published in 2018), and has published the guidance titled, *NG911 Interstate Playbook*.
- TFOPA Working Group 1 describes the EC3 concept and requirements in its report titled, *Optimal Cybersecurity Approach for PSAPs*.
- NASNA publishes planning considerations and regional case studies.
- NENA published the guidance titled, *NG911 Transition Plan Considerations Information Document* and several technical requirements documents concerning i3 requirements.
- The Association of Public Safety Communications Officials-International (APCO) provides a variety of operational, technical, and training standards and best practices that are relevant to the planning stage.

Identify strategies and resources to address policy, regulatory, governance, and funding issues or obstacles faced by jurisdictions both independently (along their transition to NG911 capabilities) and collectively as they relate to achieving nationwide interconnectivity.

ISSUE	TASK(S)	BENEFICIAL OUTCOMES
POLICY CONFLICTS Jurisdictional NG911 planning and transition is often hindered by policy-related issues that affect multiple business factors. For example, planning for the decommissioning of legacy systems can be difficult to navigate due to necessary repeals of old governance frameworks, statutes, and/or laws. Or, demarcation of cost sharing responsibilities is sometimes unclear and predicated on legal decisions that were made prior to the existence of NG911 capabilities and the expectation of a nationwide NG911 system of systems, thus stagnating forward momentum.	**Business 12. Continue to develop case studies about how issues identified have been dealt with at jurisdictional and federal levels.** **Business 13. Develop national-level NG911 policies that address parameters for national interconnectivity of jurisdictional 911 systems.**	• Visibility on how jurisdictions have approached NG911 strategies and handled cases of policy repeal and replace. • Data that informs efforts toward establishing best practices and other guidance material. • A strategy for ensuring that 911 policies take into account the needs and impacts of NG911 functions, components, systems, transition, and maturation. • Policies that govern how jurisdictions interact within a nationwide NG911 system of systems.

RELEVANT WORK ACCOMPLISHED OR CURRENTLY IN PROGRESS

- The FCC *Communications Security Reliability, and Interoperability Councils (CSRIC)* working groups have addressed a variety of specific NG911 transition issues including the decommissioning of legacy systems.
- APCO is an active participant in advancing legislative issues related to NG911 addressing policy related to network resiliency, 911 reliability, the handling of non-emergency calls, and PSAP text-to-911 readiness and implementation.
- The National 911 Program's guidance titled, *NG911 Interstate Playbook* discusses demarcation/cost sharing issues.
- Two relevant resources produced by the National 911 Program and NASNA have been updated and will be released in 2018: 1) *Guidelines for State NG911 Legislative Language*, and 2) *Guidelines for Developing a State NG911 Plan.*
- The National Conference of State Legislatures (NCSL) maintains the *State 9-1-1 Bill Tracking Database* which can be informative toward identifying areas where policies may need adjustment in an interconnected environment.

Stimulate adoption and enable implementation of NG911 technology by promulgating NG911 open standards and establishing means by which emerging technologies can be validated for compliance and security.

ISSUE	TASK(S)	BENEFICIAL OUTCOMES
NATIONWIDE NG911 COMPONENTS Several components of a nationwide NG911 system will be needed at a nationwide level. The system of systems of ESInets needs to be interconnected via a hub (a nationwide ESInet) that funnels interaction. An environment that would require all jurisdictional ESInets to connect directly to multiple other ESInets would be cost prohibitive.	**Tech 1. Design, implement, and operate a nationwide ESInet** **Tech 2. Design, implement, and operate a nationwide Forest Guide** **Tech 3. Design, implement, and operate a nationwide PSAP Registry** **Tech 4. Design, implement, and operate a nationwide GIS Data Store** **Tech 5. Design, implement, and operate a nationwide ICAM** **Tech 6. Design, implement, and operate a nationwide cybersecurity capability such as EC3**	• Nationwide sharing of information • Reduction of costly interconnections between state and regional ESInets

RELEVANT WORK ACCOMPLISHED OR CURRENTLY IN PROGRESS

- TFOPA Working Group 1 describes the EC3 concept and requirements in its report titled, *Optimal Cybersecurity Approach for PSAPs*.
- NENA has published the guidance titled, *NENA Requirements for a National Forest Guide*. The guide contains an analysis of cost factors and cost recovery considerations that are helpful to identifying the next level of information needed to recruit and formalize a development and implementation champion.
- The First Responder Network Authority (FirstNet) has brought various stakeholders within the public safety community to address the development of a national ICAM solution.
- The FCC maintains the *911 Master PSAP Registry* that contains data about primary and secondary PSAPs.

Stimulate adoption and enable implementation of NG911 technology by promulgating NG911 open standards and establishing means by which emerging technologies can be validated for compliance and security.

ISSUE	TASK(S)	BENEFICIAL OUTCOMES
NATIONAL-LEVEL CYBERSECURITY Reticence about NG911 migration exists—at both the jurisdictional and national levels—due to valid concerns about added cyberthreats and the need to fortify cybersecurity measures. For example, multiple PSAPs across 12 states experienced Telephone Denial of Service attacks that were spread via a hyperlink on a well-known social media site. Wireless phones of users who clicked on the link were infected by malware that instructed the phone to auto-dial 911 repeatedly.	**Tech 7. Develop a research report on the need for and feasibility of a nationwide cybersecurity and cyberthreat response framework.** **Tech 8. Develop minimum standards and requirements for network interconnection and impacts on facility and personnel security.** **Tech 9. Develop a strategy for expanding the connection between national Information Sharing Analysis Centers (ISACs) and PSAPs to augment national-level NG911 security.**	• Identification of cybersecurity and cyberthreat mitigation and response models that may be nationally scalable for NG911 purposes. • Improved and more focused requirements or standards that establish minimum capabilities for securing NG911 systems, workforce, etc. • Identification of ways/mechanisms by which ISAC's can partner with jurisdictions to help augment cybersecurity threat detection and mitigation.

RELEVANT WORK ACCOMPLISHED OR CURRENTLY IN PROGRESS

- The National 911 Program partnered with the DHS Office of Emergency Communication on the development of the *NG911 Cybersecurity Primer*.
- The National Institute of Standards and Technology (NIST) has published cybersecurity standards for critical infrastructure.
- NENA has published the resource titled, *Next Generation 9-1-1 Security (NG0SEC) Audit Checklist*.
- TFOPA Working Group 1 describes the EC3 concept and requirements in its report titled, *Optimal Cybersecurity Approach for PSAPs*.
- The *Information Sharing and Analysis Organization (ISAO SO)* addresses cybersecurity risks and best practices as they relate to emergency management and response.
- The FCC *CSRIC Council II* focuses on cybersecurity best practices.
- The *DHS National Coordinating Center for Communications (NCC)* oversees the goal to avert/mitigate impacts on telecommunications infrastructure.
- *InfraGard* addresses cybersecurity issues as they relate to critical infrastructure.
- APCO's Project 43 addresses cybersecurity education and training, resources and strategic planning related to broadband implications for the PSAP.

Stimulate adoption and enable implementation of NG911 technology by promulgating NG911 open standards and establishing means by which emerging technologies can be validated for compliance and security.

ISSUE	TASK(S)	BENEFICIAL OUTCOMES
CARRIER MIGRATION AND DELIVERY STANDARDS A baseline standard for ubiquitous carrier services does not exist. For example, over 1,000 carriers currently provide services and are looking for a common interface/standard for interconnection. Standards were developed for enhanced 911 (E911) migration and delivery but have not been adapted for NG911.	**Tech 10. Identify technical issues involved in carrier migration and delivery.** **Tech 11. Develop minimum standards for timelines for OSP migration to aggregation points.** **Tech 12. Develop policy that facilitates carrier migration to NG911.**	• Identification of negative impacts that occur due to the absence of such requirements. • Visibility of cases where gateway carrier requirements have successfully been instituted at the jurisdictional level. • Data that informs whether requirements are actually needed, and if so, what it would take to achieve development and adoption.

RELEVANT WORK ACCOMPLISHED OR CURRENTLY IN PROGRESS

- The FCC has published guidance on modernizing telecommunications networks.
- The Alliance for Telecommunications Industry Solutions (ATIS) has developed models for network-to-network interfaces.

Stimulate adoption and enable implementation of NG911 technology by promulgating NG911 open standards and establishing means by which emerging technologies can be validated for compliance and security.

ISSUE	TASK(S)	BENEFICIAL OUTCOMES
VALIDATION, VERIFICATION, TESTING & EVALUATION OF NG911 RELEVANT FUNCTIONS/SYSTEMS Jurisdictional reticence to invest in and adopt NG911 components, parts, or functions exists due to the lack of bandwidth, ability, or understanding required to validate NG911 compliance, verify legitimacy of certain emerging technologies, and/or test functions or technologies in a beta environment that is safe and not disruptive to day-to-day operations and supportive systems. A certification of solutions by a standards body that verifies compliance would assure decision-makers that that the solutions they are considering will perform certain functions and not require costly upgrades in the future to become compliant.	**Tech 13. Develop minimum requirements that technologies must meet to verify overall legitimacy to 911 service delivery and impact to the 911 ecosystem (e.g., workforce needs, cybersecurity risks).** **Tech 14. Develop standards and requirements for NG911 system testing and evaluation, including external systems that interact with NG911 functions (e.g., FirstNet, alarm systems, telematics devices).** **Tech 15. Research the feasibility of establishing sanctioned testing facilities to enable focused, safe evaluation of NG911 products and emerging technologies.** **Tech 16. Research the feasibility of establishing a credentialing authority for NG911 compliance.**	• Set of baseline requirements that enable appropriate emerging applications to enter the NG911 ecosystem safely, purposefully, and in support of nationwide interconnectivity and interoperability. • Set of baseline performance metrics and requirements for testing the effectiveness of NG911 systems, applications, and workflows. • Risk-free accommodations for testing, piloting, and evaluating technology. • Motivation for industry to develop i3 Solution-compliant technology.

RELEVANT WORK ACCOMPLISHED OR CURRENTLY IN PROGRESS

- In 2018, NENA issued a *Request for Information* pertaining to plans for an NG9-1-1 Conformance Testing service. NENA has also published a wide array of performance standards, including product certification standards and has established a working group focused on application verification needs.
- APCO has addressed standards issues between NG911 and a variety of emergency applications, has published best practices for PSAP processing of vehicle telematics calls from service providers and alarm companies and, through its Project 43, addresses broadband implications for the PSAP.

Support the enhancement of 911 services by establishing technical and operational data solutions that support cross-jurisdictional and national-level situational awareness, information sharing, and predictive data analysis.

ISSUE	TASK(S)	BENEFICIAL OUTCOMES
NATIONAL NG911 DATA SYSTEM Nationwide 911 data collection and analysis is limited and does not typically entail sharing and exchange of performance-based information, making it difficult to accurately assess NG911 maturation, the quality of 911 service delivery that is occurring across the country, and future needs of U.S. residents and visitors based on data-driven analysis of trends. Additionally, data models and standards for every aspect of NG911 implementation must exist to enable seamless cross-jurisdictional information sharing. Such an effort would enable cross-pollination of data with emergency medical services, fire management, and law enforcement, making possible data-driven, evidence-based decision making and capabilities to mitigate impact.	**Data 1. Address recommendations that surface as a result of the National 911 Program's Strategic Planning for Collection and Use of Nationwide Data project.** **Data 2. Develop NG911-related data models, requirements, and standards relevant to the entire lifecycle of 911 call handling and response (as sanctioned by the 911 community).**	• Identification of national data collection frameworks that exist, the purpose they fulfill, and the extent to which they sere stakeholders on a national-scale. • Data that informs efforts toward establishing a model and requirements for national data collection on 911 service delivery and performance evaluation. • Comprehensive visibility on any gap areas pertaining to security, data handling, data transfer, record keeping, and data management procedures. • Data that informs efforts toward establishing new NG911 standards or updating existing standards to align with NG911 technical and operational capabilities. • Availability of data relevant to the provision of mutual aid ensuring optimal services under collaborative circumstances.

RELEVANT WORK ACCOMPLISHED OR CURRENTLY IN PROGRESS

- The National 911 Program is collaborating with private and public-sector stakeholders on its Strategic Planning for Collection and Use of Nationwide 911 Data project. The intended products of this effort include strategic and implementation plans for establishing a national 911 data system. The National 911 Program also engages with the Program Managers-Information Sharing Environment (PM-ISE) and the Information Sharing Council (ISC) on examining lessons learned by other federal agencies on data collection and information sharing.
- NENA has commissioned several working groups focused on NG911-level data management.

Support the enhancement of 911 services by establishing technical and operational data solutions that support cross-jurisdictional and national-level situational awareness, information sharing, and predictive data analysis.

ISSUE	TASK(S)	BENEFICIAL OUTCOMES
MULTIMEDIA DATA COLLECTION & MANAGEMENT There is a lack of understanding of the art-of-the-possible and service delivery benefits involved in expanding to NG911 data formats, thus impeding NG911 planning and functional investments.	**Data 3. Develop pilots to test the integration, use, and aggregation of additional data and multimedia (e.g., photos, real-time text, social media, videos).** **Data 4. Develop pilots to test NG911 integration with Smart City initiatives and IoT systems.**	• Visibility on successes and lessons learned in areas of enhanced service delivery, technical requirement and impacts, operational needs to accommodate the collection of larger and different data sets, and what is procedurally required to ensure the integrity, proper handling, and security of such data. • Identification of any needs for NG911 data standards. • Data that informs efforts toward establishing best practices and other guidance materials.

RELEVANT WORK ACCOMPLISHED OR CURRENTLY IN PROGRESS

- The National 911 Program publishes its report titled, *NG911 Standards Identification and Review*, on an annual basis is addressing multimedia data issues as part of its Strategic Planning for Collection and Use of Nationwide 911 Data project.
- NENA examines the impact of IoT devices and emergency application on NG911 through its IoT and Apps Working Group.
- The Smart Cities Council and the NG911 Institute has addressed the intersection of IoT, smart communities, and NG911 through several white papers and presentations.
- RapidSOS conducted the *NG911 Clearinghouse Android ELS Pilot Project* in January 2018 to identify the art-of-the-possible as it relates to using Android Emergency Location Service (ELS) to more quickly and accurately determine the location of wireless 911 calls.

Support the enhancement of 911 services by establishing technical and operational data solutions that support cross-jurisdictional and national-level situational awareness, information sharing, and predictive data analysis.

ISSUE	TASK(S)	BENEFICIAL OUTCOMES
USE OF GIS DATA The use of real-time, geographic data and GIS is lacking throughout the 911 community due to various factors that include the lack of technology to support such data, the lack of awareness of where to find such data, and a given jurisdiction's lack of GIS resources or assets. This impacts the ability for PSAPs to conduct geographic routing of 911 calls and hinders multi-jurisdictional situational awareness. Impact of these challenges could include different jurisdictions interpreting GIS data differently, causing first responders to show up at different locations.	**Data 5. Develop an inventory of existing policies relevant to geographic routing of 911 calls (regardless of technology used).** **Data 6. Develop needed standards/requirements for NG911 consumption and handling of GIS data.** **Data 7. Compile best practices for NG911 GIS.** **Data 8. Research the feasibility of establishing a national map that can be accessed by all PSAPs.**	• Comprehensive visibility on how jurisdictions have handled policy related to geographic routing. • Data that informs efforts toward establishing a baseline for NG911 GIS standards and requirements. • Set of baseline requirements or standards that establish minimum capabilities for consuming, transferring, and handling GIS data. • Guidance that helps jurisdictions improve accuracy of GIS data for mapped automatic location identification (ALI) to a minimum of 98 percent, establish boundary rectification, update maintenance plan processes, incorporate floor plans for buildings, etc.

RELEVANT WORK ACCOMPLISHED OR CURRENTLY IN PROGRESS

- The National 911 Program highlights publishes its report titled, *NG911 Standards Identification and Review*, on an annual basis and is addressing GIS data issues as part of its Strategic Planning for Collection and Use of Nationwide 911 Data project.
- The FCC adopted a Notice of Inquiry, *Location-based Routing for Wireless 911 Calls*, to examine how to route wireless 911 calls to the proper PSAP more quickly.
- The National States Geographic Information Council (NSGIC), NENA, and the National Alliance for Public Safety GIS Foundation (NAPSG) address these issues through reports, webinars, etc.
- The Open Geospatial Consortium (OGC) develops standards related to GIS data for multiple utilities, including 911.

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Distinguish, enhance, and promote operating procedures, performance evaluation, and professional development strategies that support complete and streamlined implementation of NG911 capabilities.

ISSUE	TASK(S)	BENEFICIAL OUTCOMES
MULTI-JURISDICTIONAL CALL HANDLING Cross-jurisdictional service delivery requires revision of both day-to-day procedures and processes for call handling when systems are stressed. Without consistency across jurisdictions, it will be difficult to avoid causing harm or disruption in services.	**Ops 1. Develop best practices based on how states have overcome cross-jurisdictional issues (e.g., call routing, liability).** **Ops 2. Develop best practices and/or national standards for operations within the NG911 environment.** **Ops 3. Create best practices for Network Operations Center (NOC) and Security Operations Center (SOC) notifications.**	• Visibility on the extent of impact fallback has had on jurisdictional service delivery and will have on cross-jurisdictional engagements. • Data that informs efforts toward establishing technical and operational requirements for avoiding fallback situations. • Comprehensive guidance that helps PSAPs anticipate, mitigate, and troubleshoot routing issues. • Guidance that would help jurisdictions establish/improve NOC establishment and operations.

RELEVANT WORK ACCOMPLISHED OR CURRENTLY IN PROGRESS

- The Virginia Information Technologies Agency (VITA) has published best practices on 911 call handling.
- The FCC issued a September 26, 2017 Notice of Inquiry that included a call for information on alternative handling of fallback situations.
- CSRIC working groups have addressed a variety of system sustainability issues.
- Best practices for NOC operations exist in a variety of fields (identifying model approaches outside of the 911 atmosphere may be useful).

Distinguish, enhance, and promote operating procedures, performance evaluation, and professional development strategies that support complete and streamlined implementation of NG911 capabilities.

ISSUE	TASK(S)	BENEFICIAL OUTCOMES
NATIONAL WORKFORCE A nationwide NG911 system of systems will require a new way of looking at how the 911 workforce is structured and the skillsets that are needed to navigate new technologies, workflows, and data. Establishing a national baseline for these factors is especially important when considering the impact on cross-jurisdictional call handling—members of the workforce will need to possess parallel skillsets in order to effectively carry out their duties and avoid disrupting any phase of the handling process. For example, the advent of presenting new data sources (e.g., video, images) to the PSAP requires methods for automation and analytical skills that will need to be defined. Additionally, decisions will be needed on whether analysis is conducted by the PSAP or another jurisdictional entity (e.g., Fusion Center).	**Ops 4. Develop NG911-appropriate job descriptions (e.g., operational, systems management, GIS)** **Ops 5. Identify necessary training (e.g., cross-jurisdictional call handling) and professional development needed to bolster the skills and growth paths of those currently in their workforce and opportunities to integrate NG911 education for those who are interested in 911 as a career.**	• Visibility on skillset gaps in the current workforce as they relate to NG911 functions. • Standardized, baseline requirements for performing in an NG911 setting. • An increase in retention of 911 staff through proactive professional development opportunities and skillset enhancement. • Standardized framework for educating new 911 workers.

RELEVANT WORK ACCOMPLISHED OR CURRENTLY IN PROGRESS

- APCO offers new hire and refresher trainings through its Public Safety Telecommunicator (PST) curriculum. APCO's Project 43 studied workforce recruitment and training issues, new hiring models, and professional development related to the implications of broadband for the PSAP.
- NENA has published a wide array of PSAP operations and staffing standards and overseen an NG911 Education and Training Work Group.
- The National Initiative for Cybersecurity Education (NICE) developed the *National Cybersecurity Workforce Framework* to define the cybersecurity workforce and provide a common taxonomy and lexicon by which to classify and categorize workers.

Distinguish, enhance, and promote operating procedures, performance evaluation, and professional development strategies that support complete and streamlined implementation of NG911 capabilities.

ISSUE	TASK(S)	BENEFICIAL OUTCOMES
INTERCONNECTIVITY WITH NONTRADITIONAL ENTITIES The ability to establish a true NG911 system of systems does not entail interconnectivity at just the jurisdictional level, but also across domains and disciplines. Without horizontal and vertical connection, groups with special needs may go unserved, valuable data may go unmined, and whole-of-community analysis of 911 needs, trends, and effectiveness will be difficult to assess. Furthermore, PSAPs are sometimes operated by academic institutions, federal agencies, and organizations. Interconnectivity with these PSAPs will likely involve unique technical and operational considerations. There are also a variety of entities that intercept crisis situations that may require 911 support (e.g., suicide prevention hotlines, social media networks). Identifying ways to provide the same level of services to their 911 needs is as critical as traditional call handling.	**Ops 6. Develop pilots and demonstrations to identify needs and best practices related to the various nontraditional domains, disciplines, and entities that either require interconnectivity or would benefit from a more direct level of access to 911 services.** **Ops 7. Develop guidelines and procedures for interconnecting with nontraditional entities.**	• Comprehensive visibility on nontraditional entities that need to be included in the NG911 system of systems, unique technical and operational considerations for establishing interconnectivity, legal ramifications that should be examined, and approaches for securing agreements or memoranda of understanding. • Models and best practices for information sharing agreements and procedures. • New datasets that can help enhance 911 services delivery and enable continuous improvement. • An expanded network of stakeholders that broadens the reach of the 911 community.

RELEVANT WORK ACCOMPLISHED OR CURRENTLY IN PROGRESS

- NENA is currently working with the North American Aerospace Defense Command (NORAD) and U.S. Department of Defense (DoD) on pipeline notifications between PSAPs and aircraft.
- RapidSOS, Penn State College of Information Sciences Technologies 3C Informatics Team, and Mission Critical Partners has launched the *Data Integration Program* which will address the filtering and prioritization of social media data in the Charleston County, South Carolina Consolidated 911 Center.

Distinguish, enhance, and promote operating procedures, performance evaluation, and professional development strategies that support complete and streamlined implementation of NG911 capabilities.

ISSUE	TASK(S)	BENEFICIAL OUTCOMES
STANDARDIZED PERFORMANCE EVALUATION When envisioning a nationwide NG911 system of systems, it is envisioned that all U.S. residents and visitors will receive the same level of care. This is difficult at this stage of jurisdictional maturity given the variation of performance data that is collected and lack of ability to analyze such data. While there are existing performance measures for PSAP services, measures do not exist for evaluating the processing of service requests at the carrier-to-PSAP stage of the call lifecycle.	**Ops 8. Evaluate the best approaches for collecting performance-related data at the national level.** **Ops 9. Develop national models for performance analysis/evaluation.** **Ops 10. Develop best practices for applying national models at the jurisdictional level.**	A nationally-adopted model that defines baseline performance metrics, performance-related data collection, and analysis of such data.

RELEVANT WORK ACCOMPLISHED OR CURRENTLY IN PROGRESS

- NENA has a wide array of performance standards available through their website.
- The National 911 Program has developed the guidance titled, *National State 911 Assessment Guidelines*, which addresses performance evaluation issues.
- APCO has developed standards for the establishment of quality assurance and quality improvement programs for PSAPs.

Facilitate education and knowledge transfer on an ongoing basis.

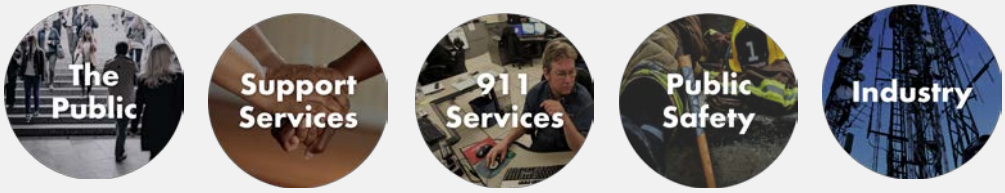
ISSUE	TASK(S)	BENEFICIAL OUTCOMES
NATIONAL KNOWLEDGE TRANSFER This Roadmap entails a number of research products, best practices documents, guidance material, and other tools. Additionally, there are scores of materials, model plans, templates, standards documents, and other products that are available through associations and agencies that address 911 and NG911 transition issues. Materials are only useful if they can be found and if they are able to be digested with context. Therefore, useful approaches for aggregating and distributing materials is greatly needed.	**Cross-Goal 1. Conduct a feasibility study on the creation a national database/repository that houses and makes accessible guidance material, research, and other resources that are relevant to the entire spectrum of NG911**	Comprehensive visibility of what such an effort would entail technically, operationally, and financially; how other national clearinghouse or database initiatives were developed and implemented; and whether other efforts have been successful or not (and why).

RELEVANT WORK ACCOMPLISHED OR CURRENTLY IN PROGRESS

The *National 911 Program*, *NENA*, *NASNA*, *APCO*, and other organizations, working groups, and associations have a wide array of 911 materials available through their websites and/or member portals.

In Conclusion…(get busy!)

We have some ways to go before achieving a nationwide NG911 system of systems, and an abundance of collective thought must occur to determine how to best configure the tasks in this Roadmap into an actionable timeline that ensures each are able to inform and build upon the other. As you consider your potential role, remember that there are a multitude of ways you can contribute.



- Become more informed about NG911.
- Advocate within your community for more effective 911 services or education.
- Engage with your community and your elected officials about the importance of NG911 capabilities.
- Help articulate technical and operational needs and challenges.
- Document and promulgate best practices and successful policies and procedures.
- Helping identify jurisdictional partnerships that could help elevate 911 issues to stakeholders who need to understand them.
- Help articulate day-to-day operational challenges that may arise due to disconnections at the policy level.
- Articulate issues experienced by industry that either hinder or enable enhanced involvement in 911 communications.
- Help develop use cases to inform standards, garner buy-in, influence technological advances, and establish national-level policies and standard operating procedures.
- Join a standards development organization or working group.
- Submit changes, recommendations, and additions to this Roadmap!

The National 911 Program is excited to witness how the 911 community continues to come together toward advancing NG911 capabilities across the U.S. It *can* be accomplished. Please contact the program at NHTSA.National911@dot.gov if you have any questions, updates, or information on progress made in any of the goal areas described. The National 911 Program looks forward to working with the community to maintain this Roadmap as progress is achieved.

Appendix 1: 911 Terms & Definitions

TERM	DEFINITION
911 (or 9-1-1)	A three-digit telephone number to facilitate the reporting of an emergency requiring a response by a public safety agency.
911 authority	A state, county, regional, or other governmental entity responsible for 911 service operations. For example, this could be a county/parish or city government, a special 911 or Emergency Communications District, a Council of Governments or other similar body.
911 "call"	A generic term used to include any type of Request For Emergency Assistance (RFEA); and is not limited to voice. This may include a session established by signaling with two way real-time media and involves a human making a request for help. We sometimes use "voice call", "video call" or "text call" when specific media is of primary importance. The term "non-human-initiated call" refers to a one-time notification or series of data exchanges established by signaling with at most one way media, and typically does not involve a human at the "calling" end. The term "call" can also be used to refer to either a "Voice Call", "Video Call", "Text Call" or "Data–only call", since they are handled the same way through most of NG9-1-1.
911 fund	The fund established by state statute that is specifically used to fund 911 activities and/or infrastructure.
911 service area	The geographic area that has been granted authority by a state or local governmental body to provide 911 services.
911 state plan	A document prepared, maintained, implemented, and updated by a state that provides a comprehensive plan for operating a statewide 911 system that communicates 911 call information across networks and among PSAPs, addresses all aspects of the statewide 911 system, and describes the allowable uses of revenue in the 911 fund.
911 system	A coordinated system of technologies used by a collaborative group of people to operate an efficient and effective network for accepting, processing, and delivering emergency information to facilitate an emergency response. A set of networks, software applications, databases, customer premises equipment (CPE) components, and operations and management procedures required to provide 911 service. This may include commercial, governmental, and human resources.
Access provider	An access provider is any organization that arranges for an individual or an organization to have access to the internet.
Additional data	Data that further describe the nature of how a call was placed, the person(s) associated with the device placing the call, or the location the call was placed from. There are three types of Additional Data: Additional Data for the Call, Additional Data for the Caller, and Additional Data for the Location.
Agency	In NG911, an organization that is connected directly or indirectly to the ESInet. Public safety agencies are examples of Agency. An entity such as a company that provides a service in the ESInet can be an Agency. Agencies have identifiers and credentials that allow them access to services and data.

TERM	DEFINITION
Agent	In NG911, an Agent is an authorized person—an employee, contractor or volunteer, who has one or more roles in an Agency. An Agent can also be an automaton in some circumstances (e.g. an IMR answering a call).
Alternate routing	The capability of routing 9-1-1 calls to a designated alternate location(s) if all 9-1-1 trunks are busy or out of service. May be activated upon request or automatically, if detectable, when 9-1-1 equipment fails or the PSAP itself is disabled.
Automatic location identifier (ALI)	The automatic display at the PSAP of the caller's address/location of the telephone and supplementary emergency services information of the location from which a call originates.
Automatic Number Identification (ANI)	The automatic display at the PSAP of the caller's telephone number associated with the access line from which a call originates.
Basic 911	An emergency telephone system which automatically connects 911 callers to a designated answering point. Call routing is determined by the originating telephone central office only. Basic 911 may or may not support ANI and/or ALI.
Call-taker	An agent of a PSAP who answers and processes emergency calls. Synonymous with the term, "Telecommunicator."
Call-taking	The act of processing a call for emergency assistance up to the point that the call is ready for dispatch, including the use of equipment, call classification, location of a caller, and determination of the appropriate response level for emergency responders.
Call handling	Functional element concerned with the details of the management of calls. It handles all communication from the caller. It includes the interfaces, devices and applications utilized by the Agents to handle the call.
Call routing	The capability to selectively route the 9-1-1 call to the appropriate PSAP.
Carrier	A function provided by a business to a customer base, typically for a fee. Examples of carriers and associated services are public switched telephone network (PSTN) service by a local exchange carrier, Voice over Internet Protocol (VoIP) service by a VoIP provider; e-mail service provided by an Internet service provider.
Commercial call center	A privately operated call center, which answers emergency and/or nonemergency calls.
Commercial mobile radio service (CMRS)	An FCC designation for any carrier or licensee whose wireless network is connected to the public switched telephone network.
CMRS connection	Each mobile handset telephone number assigned to a CMRS subscriber with a place of primary use in-state.
CMRS provider	An entity, whether facilities-based or non-facilities-based, that is licensed by the Federal Communications Commission to provide CMRS or that resells CMRS within a state.
Computer-aided Dispatch (CAD)	A computer-based system that aids PSAP telecommunicators by automating selected dispatching and record keeping activities.
Continuity of Operations (COOP)	The ability to continue operations during and after a service impacting event through a specific set of procedures designed to reduce the damaging consequences of unexpected events resulting in the loss of 911 capabilities.
Customer premise equipment (CPE)	Communications or terminal equipment located in the customer's facilities—terminal equipment at a PSAP.

TERM	DEFINITION
Database	An organized collection of information, typically stored in computer systems, comprised of fields, records (data), and indexes. In 911, such databases include Master Street Address Guide (MSAG), telephone number/Emergency Service Number (ESN), and telephone customer records.
Data exchange	The process of exchanging 911 data between service providers and the database management system provider.
Dispatch system	Functional element used to assign appropriate resources (emergency responders) to an incident, monitor the response and relay relevant information. Tracks and logs all transactions associated with the emergency response.
Enhanced 911 (E911)	A telephone system that includes network switching, database and PSAP premise elements capable of providing automatic location identification data, selective routing, selective transfer, fixed transfer, and a call-back number. The term also includes any enhanced 911 service so designated by the Federal Communications Commission in its Report and Order in WC Docket Nos. 04-26 and 05-196, or any successor proceeding.
Emergency Medical Services	A service providing out-of-hospital acute care and transport to definitive care, to patients with illnesses and injuries which the patient believes constitute a medical emergency.
Emergency services IP network (ESInet)	An ESInet is a managed IP network that is used for emergency services communications, and which can be shared by all public safety agencies. It provides the IP transport infrastructure upon which independent application platforms and core services can be deployed, including, but not restricted to, those necessary for providing NG911 services. ESInets may be constructed from a mix of dedicated and shared facilities. ESInets may be interconnected at local, regional, state, federal, national and international levels to form an IP-based inter-network (network of networks). The term ESInet designates the network, not the services that ride on the network.
First Responder Network Authority (FirstNet)	Signed into law on February 22, 2012, the *Middle Class Tax Relief and Job Creation Act* created the First Responder Network Authority (FirstNet). The law gives FirstNet the mission to build, operate and maintain the first high-speed, nationwide wireless broadband network dedicated to public safety. FirstNet will provide a single interoperable platform for emergency and daily public safety communications. http://www.firstnet.gov/
Geographic information Systems (GIS)	A system for capturing, storing, displaying, analyzing and managing data and associated attributes which are spatially referenced.
i3 Solution	NENA i3 introduces the concept of an Emergency Services IP network (ESInet), which is designed as an IP-based inter-network (network of networks) shared by all agencies which may be involved in any emergency.
Interlocal services agreement	An agreement among governmental jurisdictions or privately owned systems, or both, within a specified area to share 911 system costs, maintenance responsibilities, and other considerations.
Internet protocol (IP)	The method by which digital data is sent from one computer to another on the Internet or other networks.
Interoperability	The capability for disparate communications systems to seamlessly interconnect and work together as a collective system.
Landline	Colloquial term for the public switched telephone network access via an actual copper or fiber optic transmission line that travels underground or on telephone poles. Used to differentiate the “wireless” connectivity of a cellular or Personal Communication System.
Legacy network gateway (LNG)	An NG911 functional Element that provides an interface between a non-IP originating network and a Next Generation Core Services (NGCS) enabled network.

TERM	DEFINITION
Legacy PSAP gateway (LPG)	The Legacy PSAP Gateway (LPG) is a signaling and media interconnection point between an ESInet and a legacy PSAP. It plays a role in the delivery of emergency calls that traverse an i3 ESInet to get to a legacy PSAP, as well as in the transfer and alternate routing of emergency calls between legacy PSAPs and NG911 PSAPs. The LPG supports an IP (i.e., Session Initiation Protocol [SIP]) interface towards the ESInet on one side, and a traditional MF or Enhanced MF interface (comparable to the interface between a traditional Selective Router and a legacy PSAP) on the other.
Local exchange carrier	A telecommunications carrier under the state/local Public Utilities Act that provides local exchange telecommunications services. Also known as incumbent local exchange carriers, alternate local exchange carriers, competitive local exchange carriers, competitive access providers, certified local exchange carriers, and local service providers.
Location information server (LIS)	A functional element in an IP-capable originating network that provides locations of endpoints (i.e., calling device). A LIS can provide Location by-Reference, or Location-by-Value, and, if the latter, in geo or civic forms. A LIS can be queried by an endpoint for its own location, or by another entity for the location of an endpoint. In either case, the LIS receives a unique identifier that represents the endpoint, for example an IP address, circuit-ID or Media Access Control (MAC) address and returns the location (value or reference) associated with that identifier. The LIS is also the entity that provides the dereferencing service, exchanging a location reference for a location value.
Master Street Address Guide (MSAG)	A database of street names and house number ranges within their associated communities defining emergency service zones (ESZs) and their associated emergency service numbers (ESNs) to enable proper routing of 911 calls.
Memorandum of Agreement (MOA)	A memorandum of agreement or cooperative agreement is a document written between parties to cooperatively work together on an agreed upon project or meet an agreed upon objective.
Memorandum of Understanding (MOU)	A memorandum of understanding is a document that expresses mutual accord on an issue between two or more parties.
Mutual aid agreement	Written agreement between agencies and/or jurisdictions in which they agree to assist one another upon request, by furnishing personnel and equipment.
National Information Exchange Model (NIEM)	A community-driven, standards-based, national model for structured information sharing. www.niem.gov
National Incident Management System (NIMS)	A standardized approach to incident management developed by DHS. It is intended to facilitate coordination between all responders (including all levels of government with public, private, and non-governmental organizations). https://www.fema.gov/national-incident-management-system
Next Generation 911 (NG911) services	"Next Generation 9-1-1 services" means a secure, IP-based, open standards system comprised of hardware, software, data, and operational policies and procedures that: a) provides standardized interfaces from emergency call and message services to support emergency communications; b) processes all types of emergency calls, including voice, text, data, and multimedia information; c) acquires and integrates additional emergency call data useful to call routing and handling; d) delivers the emergency calls, messages, and data to the appropriate public safety answering point and other appropriate emergency entities based on the location of the caller; e) supports data, video, and other communications needs for coordinated incident response and management; and f) interoperates with services and networks used by first responders to facilitate emergency response. *REF: Agreed to by NENA, NASNA, iCERT, and the National 9-1-1 Office representatives on 01/12/2018.*

TERM	DEFINITION
Order of authority	A formal order by the state or local authority which authorizes public agencies or public safety agencies to provide 911 service in a geographical area.
Prepaid wireless telephone service	Telephone service authorized by the purchase of CMRS, either exclusively or in conjunction with other services. This service must be paid for in advance and is sold in units or dollars whose number or dollar value declines with use and is known on a continuous basis.
Private 911 Emergency Answering Point	An answering point operated by nonpublic safety entities with functional alternative and adequate means of signaling and directing response to emergencies. Includes training to individuals intercepting call for assistance that is in accordance with applicable local emergency telecommunications requirements. Private 911 emergency answering points are an adjunct to public safety response and as such must provide incident reporting to the public safety emergency response centers per local requirements.
Proprietary information	Subscriber lists, technology descriptions, technical information, or trade secrets that are developed, produced, or received internally by a voice communications service provider or by a voice communications service provider's employees, directors, officers, or agents.
Public safety agency	A functional division of a public agency that provides firefighting, police, medical or other services to respond to and manage emergency incidents.
Public safety answering point (PSAP)	An entity responsible for receiving 911 calls and processing those calls according to a specific operational policy. • Primary PSAP: A PSAP to which 911 calls are routed directly from the 911 Control Office. • Secondary PSAP: A PSAP to which 911 calls are transferred from a primary PSAP. • Alternate PSAP: A PSAP designated to receive calls when the primary PSAP is unable to do so. • Consolidated PSAP: A facility where multiple public safety agencies choose to operate as a single 911 entity. • Legacy PSAP: A PSAP that cannot process calls received via i3-defined call interfaces (IP-based calls) and still requires the use of centralized automatic message accounting (CAMA) or integrated services digital network (ISDN) trunk technology for delivery of 911 emergency calls. • Serving PSAP: The PSAP to which a call would normally be routed. • NG911 PSAP: This term is used to denote a PSAP capable of processing calls and accessing data services as defined in NENA's i3 specification, NENA NENA-STA-010, and referred to therein as an "i3 PSAP."
Service provider	An entity providing one or more of the following 911 elements: network, CPE, or database service.
Standards development organization (SDO)	An entity whose primary activities are developing, coordinating, promulgating, revising, amending, reissuing, interpreting, or otherwise maintaining standards that address the interests of a wide base of users outside the standards development organization.
Subscriber	A person who purchases a communications service and is able to receive it or use it periodically over time.
Telecommunication	The transmission, between and among points specified by the user, or information of the user's choosing, without change in the form of content of the information sent and received, regardless of the facilities, equipment or technology used.
Telecommunicator	Person employed by a PSAP and/or an Emergency Medical Dispatch (EMD) service provider qualified to answer incoming emergency telephone calls and/or provides for the appropriate emergency response either directly or through communication with the appropriate PSAP.

TERM	DEFINITION
Virtual PSAP	An operational model directly enabled through NG911 features and/or network hosted PSAP equipment in which telecommunicators are geographically dispersed, rather than working from the same physical location. Remote access to the PSAP applications by the dispersed telecommunicators requires the appropriate network connections, security, and work station equipment at the remote location. Unified communications applications supporting voice, data, instant messaging, and video communications between telecommunicators may be used to enable the telecommunicators to work cooperatively from diverse locations. The virtual work place may be a logical combination of physical PSAPs, or an alternate work environment such as a satellite facility, or any combination of the above. Workers are connected and interoperate via IP connectivity.
Voice communications service	The transmission, conveyance, or routing of real-time two-way voice communications to a point or between or among points or through any electronic, radio, satellite, cable, optical, microwave, wireline, wireless, or other medium or method, regardless of the protocol used, including interconnected VoIP service.
Voice over Internet protocol (VoIP)	Technology that permits delivery of voice calls and other real-time multimedia sessions over IP networks.

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Appendix 2: Associations, Organizations & Other Stakeholder Entities Relevant to 911

NAME/ACRONYM	DESCRIPTION	WEBSITE
American National Standards Institute (ANSI)	Entity that coordinates the development and use of voluntary consensus standards in the United States and represents the needs and views of U.S. stakeholders in standardization forums around the globe.	www.ansi.org
Association of Public Safety Communications Officials (APCO)	APCO is the world's oldest and largest not-for-profit professional organization dedicated to the enhancement of public safety communications.	http://www.apcointl.org/
American Registry for Internet Numbers (ARIN)	An organization that provides services related to the technical coordination and management of Internet number resources.	https://www.arin.net/
Alliance for Telecommunications Industry Solutions (ATIS)	A U.S.-based organization that is committed to rapidly developing and promoting technical and operations standards for the communications and related information technologies industry worldwide using a pragmatic, flexible and open approach.	www.atis.org
Commission on Accreditation for Law Enforcement Agencies (CALEA)	Created in 1979 as a credentialing authority through the joint efforts of law enforcement's major executive associations: • International Association of Chiefs of Police (IACP); • National Organization of Black Law Enforcement Executives (NOBLE); • National Sheriffs' Association (NSA); and the • Police Executive Research Forum (PERF). The purpose of CALEA's Accreditation Programs is to improve the delivery of public safety services, primarily by: maintaining a body of standards, developed by public safety practitioners, covering a wide range of up-to-date public safety initiatives; establishing and administering an accreditation process; and recognizing professional excellence.	http://www.calea.org/
Communications Security, Reliability, and Interoperability Council (CSRIC) (formerly known as the Network Reliability and Interoperability Council [NRIC])	An advisory body of the FCC which provides recommendations to the FCC to ensure, among other things, optimal security and reliability of communications systems, including telecommunications, media, and public safety.	https://www.fcc.gov/about-fcc/advisory-committees/communications-security-reliability-and-interoperability-council-0

NAME/ACRONYM	DESCRIPTION	WEBSITE
Emergency Services Interconnection Forum (ESIF)	An open, technical/operational forum, under the auspices of the ATIS, with the voluntary participation of interested parties to identify and resolve recognized 911 interconnection issues. "The interest of all members will be served by observing the principles of openness, fairness, consensus, and due process. ESIF will liaise with standards and governmental organizations to apprise them of its deliberations and decisions. Discussions will be focused on the FCC's Wireless Phase I and II mandates, and into other areas of emergency services interconnection."	www.atis.org/esif
Federal Communications Commission (FCC)	An independent U.S. government agency overseen by Congress, the FCC regulates interstate and international communications by radio, television, wire, satellite and cable in all 50 states, the District of Columbia and U.S. territories.	https://www.fcc.gov/
Federal Geographic Data Committee (FGDC)	The Federal Geographic Data Committee (FGDC) is an interagency committee that promotes the coordinated development, use, sharing, and dissemination of geospatial data on a national basis.	https://www.fgdc.gov/
First Responder Network Authority (FirstNet)	Signed into law on February 22, 2012, the *Middle Class Tax Relief and Job Creation Act* created FirstNet. The law gives FirstNet the mission to build, operate and maintain the first high-speed, nationwide wireless broadband network dedicated to public safety. FirstNet will provide a single interoperable platform for emergency and daily public safety communications.	http://www.firstnet.gov/
Industry Council for Emergency Response Technologies (iCERT)	iCERT's mission is to serve as the voice of the commercial sector in the emergency response technologies field. iCERT members assist public policymakers and government emergency communications professionals as they address complex choices regarding advanced communications technology alternatives in the years ahead. Through advocacy, research, and in coordination with the public sector, iCERT plays a vital role in the development and deployment of emergency response technologies.	https://www.theindustrycouncil.org/

NAME/ACRONYM	DESCRIPTION	WEBSITE
Internet Architecture Board (IAB)	The IAB is the committee charged with oversight of the technical and engineering development of the Internet by the Internet Society (ISOC). It oversees a number of Task Forces, of which the most important are the Internet Engineering Task Force (IETF) and the Internet Research Task Force (IRTF). The body which eventually became the IAB was originally formed by the U.S. DOD's Defense Advanced Research Projects Agency under the name Internet Configuration Control Board in 1979; it eventually became the Internet Advisory Board in September, 1984, and then the Internet Activities Board in May, 1986 (the name was changed, while keeping the same acronym). It finally became the Internet Architecture Board, under ISOC, in January, 1992, as part of the Internet's transition from a U.S.- government entity to an international, public entity.	https://www.iab.org/
International Academies of Emergency Dispatch	A non-profit standard-setting organization, formerly known as the National Academies of Emergency Dispatch (NAED), promoting safe and effective emergency dispatch services worldwide.	http://www.emergencydispatch.org/
Internet Assigned Numbers Authority (IANA)	IANA is the entity that oversees global IP address allocation; Domain Name System (DNS) root zone management, and other Internet protocol assignments.	www.iana.org
Internet Corporate for Assigned Names and Numbers (ICANN)	Authority for public domain addresses and URLs, including related policies and databases.	https://www.icann.org/
Institute of Electrical and Electronic Engineers (IEEE)	A publishing and standards making body responsible for many telecom and computing standards.	https://www.ieee.org/
Internet Engineering Steering Group (IESG)	The IESG is a body composed of the Internet Engineering Task Force Chair and Area Directors.	https://www.ietf.org/about/groups/iesg/
Internet Engineering Task Force (IETF)	Lead standard setting authority for internet protocols.	https://www.ietf.org/
Integrated Justice Information Systems Institute (IJIS)	The IJIS Institute, a 501(c)(3) nonprofit corporation, represents industry's leading companies who collaborate with local, state, tribal, and federal agencies to provide technical assistance, training, and support services for information exchange and technology initiatives. The mission of the IJIS Institute is to unite the private and public sectors to improve critical information sharing for those who provide public safety and administer justice in our communities.	www.ijis.org
International Committee for Information Technology Standards (INCITS)	A U.S.-based standards development organization dedicated to the creation of information technology standards.	www.incits.org

NAME/ACRONYM	DESCRIPTION	WEBSITE
International Standards Organization (ISO)	An independent, non-governmental international organization with a membership of 161 national standards bodies.	www.iso.org
International Telecommunication Union (ITU)	The telecommunications agency of the United Nations established to provide worldwide standard communications practices and procedures. Formerly the Consultative Committee for International Telephony and Telegraphy (CCITT).	https://www.itu.int/en/Pages/default.aspx
National 911 Program	The National 911 Program's mission is to provide federal leadership and coordination in supporting and promoting optimal 911 services. This federal "home" for 911 plays a critical role by coordinating federal efforts that support 911 services across the nation.	https://www.911.gov/
National Suicide Prevention Lifeline (LIFELINE)	The National Suicide Prevention Lifeline is a national network of local crisis centers that provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.	https://suicidepreventionlifeline.org/
North American Network Operators Group (NANOG)	A governing body that provides guidance and instructions for the design of an IP network. NANOG is typically involved in the best current operational practices for IPv6 planning.	https://www.nanog.org/about/home
North American Numbering Plan Administration (NANPA)	The organization that has overall administrative responsibility of the North American Numbering Plan (NANP), an integrated telephone numbering plan serving 20 North American countries that share its resources.	www.nationalnanpa.com
National Association of Search and Rescue (NASAR)	Non-profit association dedicated to advancement of professional, literary and scientific knowledge and training in the search and rescue field.	http://www.nasar.org/
National Association of State 911 Administrators (NASNA)	An association that represents state 911 programs in the field of emergency communications.	www.nasna911.org
National Center for Missing and Exploited Children (NCMEC)	The National Center for Missing & Exploited Children® opened in 1984 to serve as the nation's clearinghouse on issues related to missing and sexually exploited children.	www.missingkids.com
National Exchange Carrier Association (NECA)	A membership association of U.S. local telecommunications companies dedicated to keeping customers connected on state-of-the-art communications networks.	www.neca.org

NAME/ACRONYM	DESCRIPTION	WEBSITE
National Emergency Number Association (NENA)	The National Emergency Number Association is a not-for-profit corporation established in 1982 to further the goal of "One Nation-One Number." NENA is a networking source and promotes research, planning and training. NENA strives to educate, set standards and provide certification programs, legislative representation and technical assistance for implementing and managing 911 systems.	www.nena.org
National Fire Protection Association (NFPA)	A global nonprofit organization, established in 1896, devoted to eliminating death, injury, property and economic loss due to fire, electrical and related hazards.	www.nfpa.org
National Highway Traffic Safety Administration (NHTSA)	NHTSA is an agency of the Executive Branch of the U.S. government, part of the Department of Transportation. It describes its mission as "Save lives, prevent injuries, reduce vehicle-related crashes." The National 911 Program is housed under NHTSA.	www.nhtsa.gov
National Integration Center (NIC)	The Department of Homeland Security's National Integration Center is responsible for managing the implementation and administration of the National Incident Management System (NIMS).	https://www.fema.gov/fema-technical-assistance-program
National Information Standards Organization (NISO)	NISO, the National Information Standards Organization, a non-profit association accredited by the American National Standards Institute (ANSI), identifies, develops, maintains, and publishes technical standards to manage information in our changing and evermore digital environment. NISO standards apply both traditional and new technologies to the full range of information-related needs, including retrieval, re-purposing, storage, metadata, and preservation.	http://www.niso.org
National Institute of Standards and Technology (NIST)	A part of the United States Department of Commerce that oversees the operation of the U.S. National Bureau of Standards. NIST works with industry and government to advance measurement science and to develop standards in support of industry, commerce, scientific institutions, and all branches of government. Their mission is to promote innovation and industrial competitiveness.	www.nist.gov
National Joint Telecommunicator Emergency Response Taskforce (TERT) Initiative (NJTI)	A partnership between APCO and NENA that has worked to develop the many facets of a TERT program and to help states develop who do not yet have an active TERT program. TERT involves a comprehensive program that includes assistance to individual states in developing programs that would lead to the establishment of predetermined and selected trained teams of individuals who can be mobilized quickly and deployed to assist communications centers during disasters.	www.njti-tert.org

NAME/ACRONYM	DESCRIPTION	WEBSITE
National Telecommunications and Information Administration (NTIA)	NTIA is the executive branch agency that is principally responsible for advising the President on telecommunications and information policy issues. NTIA's programs and policymaking focus largely on expanding broadband Internet access and adoption in America, expanding the use of spectrum by all users, and ensuring that the Internet remains an engine for continued innovation and economic growth.	https://www.ntia.doc.gov/
Organization for Advancement of Structured Information Standards (OASIS)	A standards development organization that promulgates standards for data interchange.	www.oasis-open.org
Open Geospatial Consortium (OGC)	A standards development organization that promulgates standards for the global geospatial community.	http://www.opengeospatial.org/
Open Mobile Alliance (OMA)	A standards development organization which develops standards for the mobile phone industry.	www.openmobilealliance.org
Packet Technologies and Services Committee (PTSC)	PTSC is an ATIS standards committee that develops standards related to services, architectures, signaling, network interfaces, next generation carrier interconnect, cybersecurity, and government emergency telecommunications service within next generation networks.	www.atis.org/PTSC
Urban and Regional Information Systems Association (URISA)	A non-profit association of professionals using GIS and other information technologies to solve challenges in US state and local government agencies.	http://www.urisa.org/

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Appendix 3: Useful Resources

Federal Rules, Regulations & Laws

- *Wireless Communications and Public Safety Act of 1999 (PL 106-81)*
- *Enhance 911 Service Act of 2004 (PL 108-494)*
- *New and Emerging Technologies 911 Improvement Act of 2008*
- *Food, Conservation and Energy Act of 2008 ("Farm Bill") (PL 110-246)*
- *Implementing Recommendations of the 9/11 Commission Act of 2007 (PL 110-53)*

Reports

- FCC TFOPA *Adopted Final Report*
- TFOPA Working Group 1 Supplemental Report—*Optimal Cybersecurity Approach for PSAPs*
- TFOPA Working Group 2 Supplemental Report—*Phase II Supplemental Report: NG9-1-1 Readiness Scorecard*
- TFOPA Working Group 3 Supplemental Report—*Funding Sustainment Model*
- GAO Report to Congressional Committees: *911 Services Most States Used 911 Funds for Intended Purposes, but FCC Could Improve Its Reporting on States' Use of Funds*
- FCC Emergency Access Advisory Committee (EACC) Working Group 7 Report—*Recommendations on Timeline Alignment*
- Canadian Radio-television and Telecommunications Commission, *A Report on Matters Related to Emergency 911*

Guidance & Research Documents

- *Guidelines for State NG911 Legislative Language**
- *Guidelines for Developing a State NG911 Plan**
- National 911 Program *State Assessment Handbook: A Guide for States Participating in the Statewide 911 System Assessment Process*
- National 911 Program *State Assessment Guidelines Synopsis Chart*
- National 911 Program *Next Generation 911 (NG911) Standards Identification and Review*
- *NG911 & FirstNet: Together Building the Future of Public Safety Communications (A Guide for State & Local Authorities)*
- *Guidelines for Minimum Training*
- National 911 Program *Next Generation 911 (NG9-1-1) Interstate Playbook, Chapter 1*
- National 911 Program *Next Generation 911 (NG9-1-1) Interstate Playbook, Chapter 2*

**Hyperlinks will be added once resources are published and posted for public distribution.*

Databases & Resource Repositories

- APCO Standards to Download
- NASNA How to Start a State 911 Program
- NASNA State 911 Contacts
- NASNA 911 Regionalization—Tools and Information
- National 911 Program Documents & Tools
- National 911 Profile Database
- NCSL Key Enacted 911 Legislation Database
- NENA Company Identifier Program
- NENA Standards & Other Documents